CLAIMS

1. A cell encapsulating device, comprising:

a semipermeable barrier layer, said semipermeable barrier layer defining a containment space for cells; and

an oxygen generator in close proximity to said semipermeable barrier layer, said oxygen generator supplying a source of oxygen for said cells.

2. The cell encapsulating device of claim 1, wherein said semipermeable barrier layer defines an immunoisolation chamber which immunosiolates said cells when the device is exposed to components of the immune system.

3. The cell encapsulating device of claim 2, wherein said immunoisolation chamber is a ring immunoisolation chamber comprising two semipermeable membranes sealed together by a ring seal.

4. The cell encapsulating device of claim 1, wherein said semipermeable barrier layer has a molecular weight cutoff of from about 50,000 daltons through about 300,000 daltons.

5. The cell encapsulating device of claim 1, further comprising cells, said cells selected from the group consisting of pancreas cells, hepatocytes, kidney cells, lung cells, neural cells, pituitary cells, parathyroid cells, thyroid cells, adrenal cells, proliferating cell lines, genetically modified cells, and combinations thereof.

6. The cell encapsulating device of claim 1, further comprising cells, said cells provided in amounts from about 10^6 cells per ml through about 10^9 cells per ml.

7. The cell encapsulating device of claim 1, further comprising cells and at least one bioactive molecule.

8. The cell encapsulating device of claim 7, wherein said bioactive molecules are selected from the group consisting of hormones, growth factors, cytokines, vascularizing agents, receptors, ligands, antibody fragments, fusion proteins, natural peptides, synthetic peptides, drugs, naked DNA, encapsulated DNA, antisense molecules, ribozymes, triple helix DNA, PNA molecules, and aptamers.

9. The cell encapsulating device of claim 1, wherein said oxygen generator electrolyzes water into oxygen and hydrogen.

10. The cell encapsulating device of claim 2, wherein the oxygen generator comprises a multilayer electrolyzer sheet.

11. The cell encapsulating device of claim 10, wherein the oxygen generator comprises an anode side and a cathode side, wherein the anode side is proximal to said semipermeable barrier layer, and wherein, when said device is implanted within a host body, said cathode side is proximal to the host body's cells and/or fluids

12. The cell encapsulating device of claim 11, further comprising a proton exchange membrane.

13. The cell encapsulating device of claim 10, wherein said multilayer electrolyzer sheet is adapted for press-fitted coupling to a ring immunoisolation chamber, said ring immunosiolation chamber comprising two semipermeable membranes sealed together by a ring seal.

14. The cell encapsulating device of claim 1, wherein said oxygen generator is in communication with an energy source.

15. The cell encapsulating device of claim 14, wherein said energy source is a battery.

16. The cell encapsulating device of claim 15, wherein said battery is rechargeable transcutaneously.

17. A method of maintaining cells in a body, comprising:

providing an immunoisolation chamber containing said cells;

generating oxygen *in situ* in said body; and

providing said oxygen to said immunoisolation chamber.

18. The method of claim 17, wherein said body lacks a function and said cells provide said function.

19. The method of claim 18, wherein said cells are genetically modified to provide said function.

20. The method of claim 18, further comprising providing said cells to a body with a condition selected from the group consisting of diabetes, hemophilia B, dwarfism, anemia, kidney failure, hepatic failure, familial hypercholesterolemia, immunodeficiency disorders, pitutitary disorders, and central nervous system disorders.

21. The method of claim 17, further comprising providing at least one bioactive molecule in said immunoisolation chamber.

22. The method of claim 17, wherein said immunoisolation chamber and said cells comprise a bioartificial organ.

23. The method of claim 17, wherein said oxygen generator is in communication with an energy source.

24. The method of claim 23, wherein said energy source is a battery.

25. The method of 25, further comprising the step of recharging said battery transcutaneously.

26. The method of claim 23, wherein said energy source is a transcutaneous energy transfer device.

27. The method of claim 17, wherein said oxygen generator, further comprises a cathode side and an anode side, and wherein said oxygen generator electrochemically transfers oxygen from the cathode side to the anode side of the oxygen generator substantially without the without generation of hydrogen.